Elements around us

Do you see iron nail?!!

Can we extract substance like gold or alminium from this iron nail?!

Of course not,
Because nail consists of iron only. And can not decomposed into two or more substance.

So, we can say that : Iron is an Element.

Element:
It is the simplest form of matter that can not be analyzed (decomposed) into two substance or more.

Some types of matter and elements forming them:

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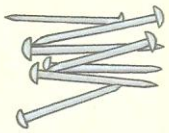
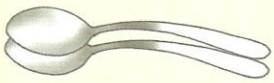
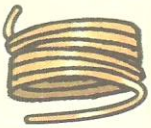
Matter	Element that composed it
 • Nails.	• Iron element.
 • Spoons.	• Aluminium element.
• Coal.	• Carbon element.
 • Electric wires.	• Copper element.

Read and learn:

** scientists have discovered 116 elements till now that divided into

Natural elements : (92 elements)

Artificial elements : (20 elements)

Elements composed of molecules that composed of atoms.

Elements molecules composed of similar atoms.

Elements				
A : Metals		B : non -metals		
Solids	liquids	Solids	Liquids	Gases
Iron Copper Aluminium Gold & silver Lead	Mercury	Sulphur Carbon Phosphorus	Bromine	Oxygen nitrogen

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We will study :

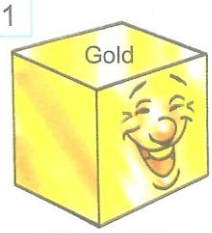
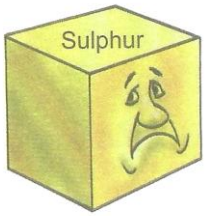
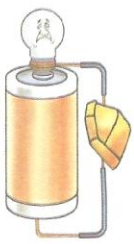
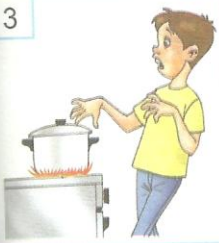
Firstly : properties of metals and non-metals:

Secondly: economic importance of some metals and non-metals:

Firstly : properties of metals and non-metals:

-

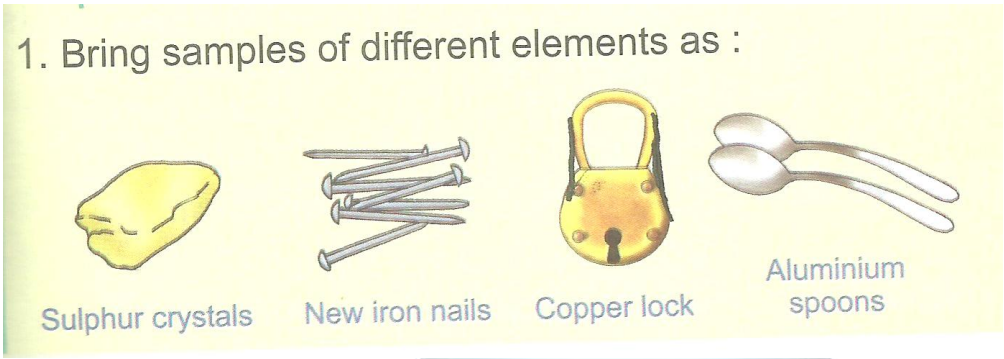
A : Metals ← → *B : non –metals*

1		Metals are shiny (have metallic luster).	,but	 Non-metals are not shiny.
2		Metals are good conductors of electricity.	,but	 Non-metals are bad conductors of electricity except carbon.
3		Metals are good conductors of heat.	,but	Non-metals are bad conductors of heat.
4		Metals have high melting and boiling points.	,but	Non-metals have low melting and boiling points.
5		Metals are malleable (can be bent).	,but	Non-metals are not malleable (cannot be bent).

Activity >>> to prove shining property of metals:

Steps :

1 – bring samples of different elements as:



2 – examine which of them shiny?!!

Observation :

New iron nails , copper and aluminum spoons are shiny ,,, while coal and sulpher are not shiny.

Conclusion:

Metals are shiny , while non-metal are not.

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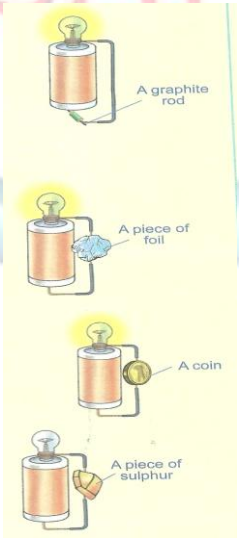
Activity :>>>> to show ability of metals and non-metals to conduct electricity.

Steps	Figures	Observation
1 – form an electric circuit connecting graphite (carbon) rod of pencil with circuit.		Electric lamp lights.
2 – repeat previous step and replace graphite with piece of aluminium foil.		Electric lamp lights.
A coin which is made of copper.		Electric lamp lights.
A piece of sulpher		Electric doesn't light.

Conclusion:

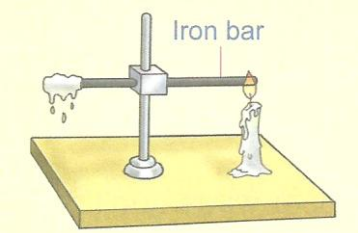
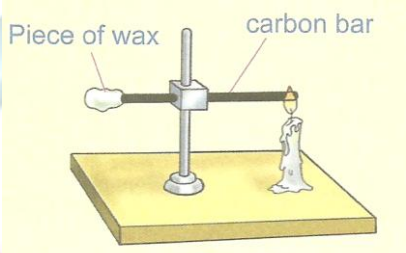
1 – metals are good conductor of electricity .

2 – non-metals are bad conductor of electricity.

G.R : we mustn't approach a nail to an electric source?

Because nail is good conductor of electricity .

Activity >>> to show ability of metals and non-metals to conduct heat.

Steps	Figures	Observation
1 – bring bars of iron , copper , aluminum and carbon.	 Fig. (A)	The piece of wax melts at different periods of time in case of iron , copper and aluminum bar.
2 – put piece of wax at one end of each bar and expose the other end to flame of candle for some time.	 Fig. (B)	2 – the piece of wax doesn't melt in case of carbon bar.
Conclusion: Metals are good conductor of heat , while non metals are bad one.		

Exercise:

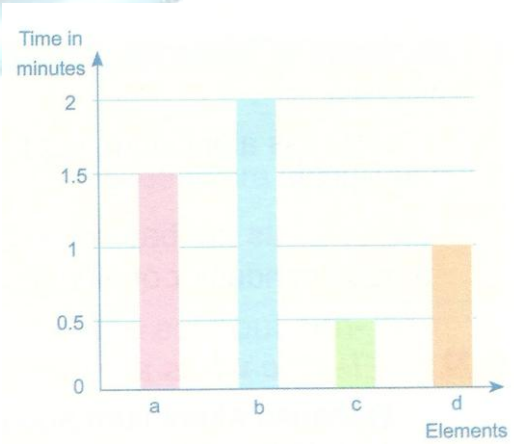
Arrange the elements in opposite diagram ascending according to their heat conductivity.

1 - …….

2 - ……

3 - ……

4 - …….



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Activity >>> show ability of metals and non metals to be melted.

Steps

1 – bring a sample of each of iron nails, copper wires and sulpher crystals.

2 – heat each sample by using a Bunsen flame.

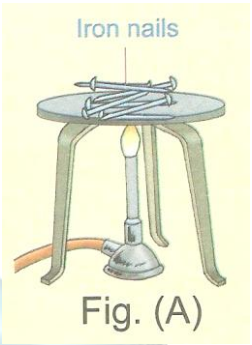

Fig. (A)

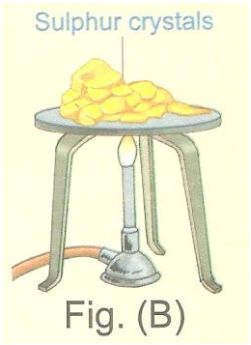

Fig. (B)

Observation:

The iron nails and copper wires don't melt, but sulpher crystals melt easily.

Conclusion:

Metals have high melting point , while non metals have low melting points.

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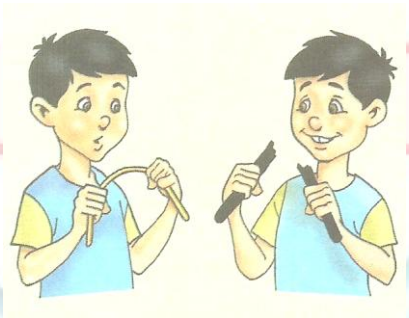
Activity >>> to show ability of metals and non metals to be shaped (malleable)

Steps	Figure	Observation
Try to bend or hammer on : Copper wire Piece of coal Sulpher crystals. Iron nail and aluminum wire.		Copper wire , iron nail and aluminum wire can be bent. Suphur crystals and piece of coal can not be bent or hammered.
Conclusion: Metals can be bent while non metals not.		

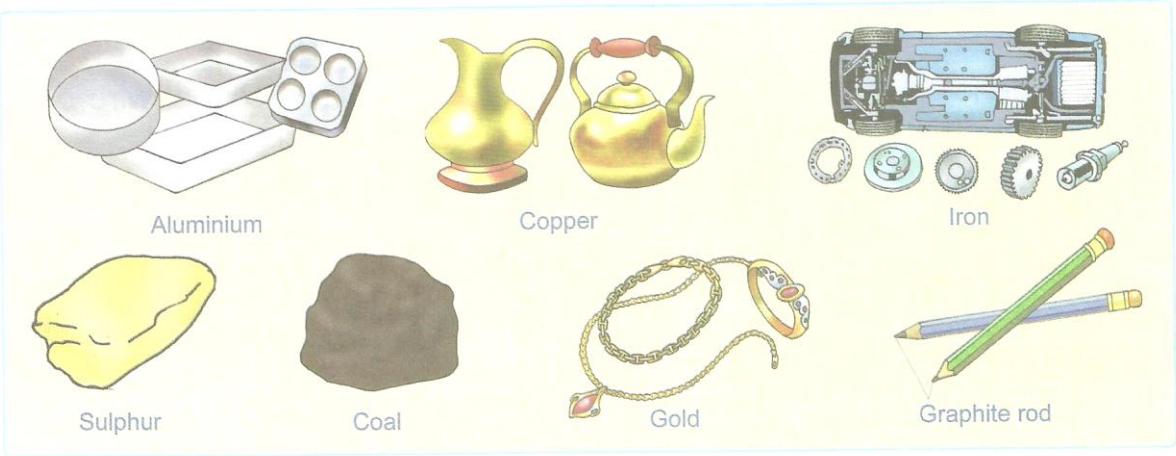
Read and learn:

Gold , silver and platinum are flexible, so we add copper to them to easily make jewels.

Aluminium metal is used in making aluminium foil which cover chocolate and sweets as it can be bent and hammered.

Exercise :

Classify the following materials into metals and non metals:



Secondly: the economic importance of some metals and non metals:

Element	Kind	Importance
Iron	Metal	Making bridges, car frames and street lights.
Aluminium	Metal	Making cooking pans, foil paper
Gold and silver	Metal	In making jewellery
Copper	Metal	In making electric wires, and metallic coins.
Carbon (graphite)	Non metal	In making positive electrodes (poles) of dry batteries.
Wood and plastic	Non metal	Making handles of cooking pans.

Read and learn:

Ancient Egyptians fused silver , gold and copper 3000 B.C

Some metals have magnetic property such as iron, cobalt and nickel

Mercury metal is used in making thermometers.

Baber Ibn Hiyan is an Arabian scientist who introduced the experimental researches in chemistry. And discover acids and alkalis.

Berzelius is a scientist who discovered rubber tubes, filter paper and some tools used in lab.

Comparison between metals and non metals:

Points	Metals	Non metals
1 – luster	Shiny	Not shiny
2 – malleability	Malleable	Not malleable
3 – heat conductivity	Good	Bad
4 – electric conductivity	Good	Bad
5 – melting and boiling points	High	Low
6 – state at room temperature.	All solids except mercury	They are: Solids : like carbon and phosphorus. Liquids as bromine. Gases as oxygen and nitrogen.

Glossary

Element	عنصر	Copper	نحاس
Coal	فحم	Natural elements	عناصر طبيعيه
Artificial	صناعى	Molecules	جزيئات
Metals	فلزات	Non metal	لا فلزات
Metallic luster	بريق معدنى	Lead	رصاص
Good conductor	موصل جيد	Melting point	درجة الذوبان
Boiling point	درجة الغليان	Lock	قفل
Samples	عينات	Malleable	قابل للثنى
Ability	قابليه	Replacing	استبدال
Coin	عمله معدنيه	Graphite rod	ساق من الجرافيت
Approach	يقترب	Bars	قضبان
Flame	لهب	Heat	حراره
Heat conductivity	توصيل حراري	Jewels	مجواهرات
Hammer on	يطرق علي	Wrapping up	تغليف
Flexible	لين	Car chassis	هياكل السيارات
Manufacture	صناعه	Statues	تماثيل
Bridges	كبارى	Doorknobs	مقابض الباب
Electrodes (poles)	اقطاب البطاريه	Thermometers	الترمومترات
Experimental	تجريبي	Filter paper	ورقة ترشيح
Magnetic property	خاصيه المغناطسيه	Introduce	يقدم
Rubber tubes	انابيب مطاطيه	Researches	ابحاث

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Questions on lesson:

Complete the following statements:

1 – elements are classified into …….. and …….

2 - …….. is a liquid non metal , while …… is a liquid metal.

3 – the group of ……. Has metallic luster , but the group of ……. Doesn't have.

4 – metals are ……. Conductors of electricity , but …….. are bad conductors of electricity except …….

5 – metals are good conductors of …… and ……

6 – metals have …….. melting points, while non metals fhave ……. Melting point.

7 - …… have the ability to be re-shaped, but …… have not.

8 – the positive poles of dry cells are made up of …….. elelment.

9 – copper is used in manufacturing of ……, …….. and ……..

10 – cooking pots are made of ……

11 - …….. is used in making bridges, while ……. Is used in making electrodes of batteries.

12- …… is used in making foil paper, but metallic coins are made up of …….

Choose the correct answer:

1 – all of the following are metals except ……
A: copper b. carbon c. iron d. aluminium.

2 – iron and copper are considered ……
A: solid metals b. liquid non metal c. gaseous non metal d. liquid metals

3 - …… is the simplest form of matter that can't be decomposed into two substances for more.
A: element b. metal c. non metal d. compound.

4 – at room temperature, all metals are in solid state except …….

A: iron b. copper c. lead d. mercury.

5 - ..... is a gaseous non metal .
A: bromine b. oxygen c. copper d. iron

6 – non metals exist in .....
A: solid state b. liquid state c. gaseous state d. a , b and c

7 – all of the following elements have metallic luster except .....
A: iron b. copper c. sulphur d. gold.

8 – an element that is a good conductor of heat and electricity is .....
A: carbon b. oxygen c. iron d. sulphur.

9 – the melting points of the following elements are relatively high except .....
A: phosphorus b. silver c. copper d. iron

10 – sulpher is non metal because .....
A: it is shiny b. it has high melting point.
c. it can be bent or shaped. D. it is a bad conductor of heat and electricity.

11 – gold and silver is used in manufacturing of .....
A: bridges b. planes. C. jewels d. cooking pots.

12 - ..... is a non metal which is used in making the positive poles of the dry cells.
A: copper b. nitrogen c. carbon d. sulphur.

13 – electric wires are made up of .....
A: sulphur b. carbon c. copper d. gold.

14 – statues are made up of .....
A: carbon b . alumimium c. sulphur d. copper.

Write scientific term:

1 – elements that haven't metallic luster. .....

2 – elements that are hammered to form sheets. .....

3 – elements have low melting and boiling points. .....

4 – a liquid non-metal. .....

5 – an element that is used in making jewellery. .....

Give reason for

1 – suphur is considered a non-metal?

……

2 – copper is used in used in manufacture of electric wires?

……

3 – cooking pans are .
3`made up of aluminium?

……

4 – copper is used in making statues and metallic coins?

……

5 – car chassis, doors and bridges are made of metals not of non metals?

……

Compare between :

Metals	Non-metals

Mention one use for each of the following:

1 – iron	
2 – aluminum	
3 – gold and silver	
4 – copper	
5 – carbon	

My wishes, Mr. Ibrahim Elsayed

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